to which the device performance increases. Each grain fraction is evenly distributed to the distributor of fractions 10. The small fraction enters the surface of the distributive cone 11, the average - on the cone 12, large - on the cone 13. The number of slit holes 9 corresponds to the number of continuous cones of the distributor of fractions 10 and the number of series of working elements 4, and In each row, in addition to the first, the limbs of working elements 4 are located at an angle. Consequently, a method for grinding grain, which provides a rational mode of loading the shredding chamber from the center to the periphery, corresponding to the distribution of the shredding force for each fraction (in the proposed method), unlike a hammer crusher and the design of the chamber of grain crushers direct impact.

References

1. Boltianskyi B. V., Boltianska L. A., Syrotyuk S. V. Analysis of the structure of energy consumption in agricultural production. Materials and International. scientific-practical Internet conference «Technical support of innovative technologies in the agro-industrial complex». Melitopol: TSATU, 2020. P. 436-442. URL: http://www.tsatu.edu.ua/tstt/wp-content/uploads/sites/6/boltjanskyj.pdf

2. Boltianskyi B., Sklyar R., Boltyanska N., Dereza S., Grigorenko S., Syrotyuk S., Jakubowski T. The Process of Operation of a Mobile Straw Spreading Unit with a Rotating Finger Body-Experimental Research. Processes 2021, 9 (7), 1144.

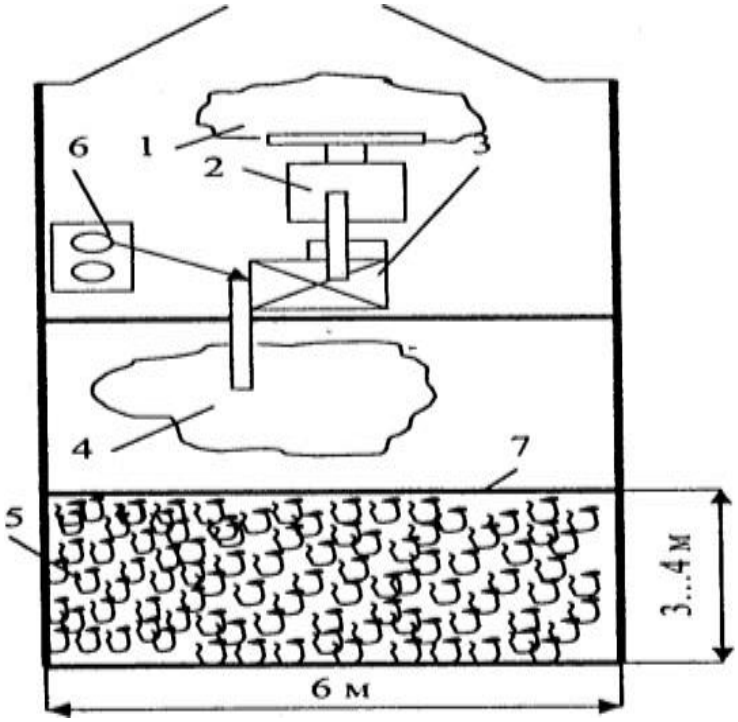
УДК 693.546

PROSPECTIVE ENERGY-SAVING TECHNOLOGY OF CONCENTRATED FEED PRODUCTION

Podashevskaya E.[1], *Boltianska N.[2]*
[1]Belarusian State Agrarian Technical University,
[2]Dmytro Motornyi Tavria State Agrotechnological University

In the structure of the feed balance of the country feed grain occupies 50-80%, but when fed in its usual form, the digestibility of nutrients by the digestive systems of animals is 40-60%. Depending on the type of crops, the starch content in unprepared grain does not exceed 20-25%. Inactivation of anti-nutrients, dextrinization of starch, destruction of cellulose-lingnin formations, creation of a microporous structure in the finished product can be achieved using chemical and physical methods of grain preparation [1, 2]. In order to reduce the loss

of biological yield of grain crops that go to fodder, and energy consumption for the production of concentrated feed, the most promising use of automated sets of equipment for grain flattening.



1 - grain heap at the unloading site; 2 - loading machine; 3 - conditioner; 4 - compartment filled with grain; 5 - compartment of the finished feed; 6 - containers with preservative; 7 - temporary partition.

Fig. 1. Technological scheme of the line of preparation of canned flattened grain in storage

It is established that, when the moisture content of barley grain increases from 17 to 35%, the specific energy consumption for flattening by smooth rollers decreases by 2.6-3.0 times. The reduction of specific energy consumption with an increase in humidity by 35% is not significant. Harvesting and use of canned flattened grain in cattle feeding allows: to reduce the cost of concentrated feed by 10-15%, while the productivity of animals increases by 7-12%; increase the gross harvest of feed grain by 8-10%, by reducing losses during harvesting; reduce energy consumption by 23% by eliminating drying, cleaning and grinding of grain; increase the digestibility of feed by 5-8%, the average daily gain of cattle - by 9-11%, milking – by 7-10%.The nutritional value of grain from harvesting-drying to laying on storage as a result of enzymatic processes is reduced by 20%. At chemical preservation of grain in tight conditions losses of dry matter make 57%. The cost of each ton of flattened and canned grain is 25-30% lower compared to the conventional technology of drying and crushing - this is a promising

energy-saving technology. High-moisture fodder grain flattening has been widely used abroad. Thus, in the USA up to 40% of fodder grain is subject to flattening, and in England – 47%, in Finland – 63%. Several technologies are used. Fig. 1 shows one of the options for placing technological equipment for plowing and canning grain in storage.

This scheme allows to obtain high productivity of the technological line in stationary conditions. The gross production of rolled grain under this scheme is 1500 tons. The peculiarity of the technological line of preparation of flattened grain according to this scheme is its high productivity and good organization of the technological process.

Grain moisture and inter-roller clearance have an important effect on the amount of specific energy consumption. With increasing humidity of the material in the range from 24 to 34% energy consumption and rise from the sieve Ø 2.5 mm decrease, and with its further increase from 34 to 40% increase.

References

1. Zhuravel D. Integrated approach to ensuring the reliability of complex systems. *Current issues, achievements and prospects of Science and education*: Abstracts of XII International Scientific and Practical Conference. Athens, Greece 2021. P. 231-233.

2. Комар А.С. Сучасні методи і обладнання для гранулювання комбікормів. *Технічне забезпечення інноваційних технологій в агропромисловому комплексі*. Мелітополь: ТДАТУ, 2020. С. 272-275. URL: http://www.tsatu.edu.ua/tstt/wp-content/uploads/sites/6/komar-2020.pdf.

3. Подашевская Е.И., Серебрякова Н.Г. Решение проблемы оптимизации рациона сельскохозяйственных животных при подготовке специалистов АПК. *Технічне забезпечення інноваційних технологій в агропромисловому комплексі*. Мелітополь: ТДАТУ, 2020. С. 740-743. URL: http://www.tsatu.edu.ua/tstt/wp-content/uploads/sites/6/podashevskaja-2020.pdf.

4. Болтянська Н.І., Маніта І. Ю. Інноваційний розвиток техніки для молочного скотарства. *Науковий вісник ТДАТУ.* Мелітополь: ТДАТУ, 2020. Вип. 10, том 2. URL: http://www.tsatu.edu.ua/tstt/wp-content/uploads/sites/6/naukovyj-visnyktdatu-2020-vypusk-10-tom-2.pdf.

5. Boltianskyi B. V., Boltianska L. A., Syrotyuk S. V. Analysis of the structure of energy consumption in agricultural production. Materials and International. scientific-practical Internet conference «Technical support of innovative technologies in the agro-industrial complex». Melitopol: TSATU, 2020. P. 436-442.